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09/675,637	09/29/2000	Kenji Yamanishi	13931	1719

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EXAMINER

SHARON, AYAL I

ART UNIT	PAPER NUMBER
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2123

DATE MAILED: 10/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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## Office Action Summary

Application No.

09/675,637

Applicant(s)

YAMANISHI ET AL.

Examiner

Ayal I. Sharon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3,6-11 and 14-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,6-11 and 14-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Introduction***

1. Claims 1-3, 6-11, and 14-16 of U.S. Application 09/675,637, originally filed on 09/29/2000, are currently pending. The application claims priority to Japanese application 275437/1999, filed 09/29/1999.
2. In the amendment filed on 8/04/2005, the Applicants have amended claims 1, 3, 7-8, 10-11, 15-16. Claims 4-5 and 12-13 have been cancelled.
3. The previously indicated allowability of claims 8-9 is withdrawn in view of the newly applied 35 U.S.C. § 101 rejections. The new rejections follow.

### ***Oath/Declaration***

4. The following published article, that was co-authored by inventors of the instant application, was cited in the previous Office Action:
  - Yamanishi et al. "On-Line Unsupervised Outlier Detection Using Finite Mixtures with Discounting Learning Algorithms." Proc. of the 6<sup>th</sup> ACM SIGKDD. pp.320-324. Aug.20-23, 2000. (Henceforth "Yamanishi").
5. The Yamanishi article appears to be directly related to the claimed subject matter. However, that article lists two additional authors, Mr. Graham Williams, and Mr. Peter Milne, who are not listed as co-inventors in the instant application. Clarification of this discrepancy is required.

6. Applicants are reminded of their declaration, which acknowledges the duty to disclose to the Office all information known to the persons to be material to patentability as defined in 37 CFR 1.56.

### ***Claim Rejections - 35 USC § 101***

7. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

8. **Claims 1-3, 6-11, and 14-16 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.** An invention which is eligible for patenting under 35 U.S.C. § 101 is in the “useful arts” when it is a machine, manufacture, process or composition of matter, which produces a concrete, tangible, and useful result. The fundamental test for patent eligibility is thus to determine whether the claimed invention produces a “**useful, concrete and tangible result.**” The test for practical application as applied by the examiner involves the determination of the following factors:

- **“Useful”** - The Supreme Court in *Diamond v. Diehr* requires that the examiner look at the claimed invention as a whole and compare any asserted utility with the claimed invention to determine whether the asserted utility is accomplished. Applying utility case law the examiner will note that:

1. the utility need not be expressly recited in the claims, rather it may be inferred.

2. if the utility is not asserted in the written description, then it must be well established.

- **"Tangible"** - Applying *In re Warmerdam*, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994), the examiner will determine whether there is simply a mathematical construct claimed, such as a disembodied data structure and method of making it. If so, the claim involves no more than a manipulation of an abstract idea and therefore, is nonstatutory under 35 U.S.C. § 101. In *Warmerdam* the abstract idea of a data structure became capable of producing a useful result when it was fixed in a tangible medium which enabled its functionality to be realized. See MPEP §2106 (A). See also *Schrader*, 22 F.3d at 295, 30 USPQ2d at 1459.
- **"Concrete"** - Another consideration is whether the invention produces a "concrete" result. Usually, this question arises when a result cannot be assured. An appropriate rejection under 35 U.S.C. § 101 should be accompanied by a lack of enablement rejection, because the invention cannot operate as intended without undue experimentation.

9. The Examiner respectfully submits that under current PTO practice, the claimed invention does not recite a tangible result.

- a. The claimed results are not tangible because they are simply mathematical constructs ("parameter values", "score calculation"). This is therefore a mathematical construct and the product of a

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manipulation of an abstract idea. In the present form of the claim, the final product is not a tangible output that has a practical application.

- b. Moreover, the claimed intended use of the invention is also of a purely mathematical nature – “degree of outlier calculation.” This is a statistical concept - a mathematical construct and no more than a manipulation of an abstract idea. It is not a practical application.

**10. Claims 10, 11 and 14 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.** Both claims recite “A computer-readable medium incorporating a program of instructions” with the apparent claim limitations describing non-functional aspects of the object definition. Additionally, the claim lacks a positive recitation that what is claimed is a medium having executable computer code that, when executed, causes a computer to perform the steps described by the claim limitations. As currently written, the claimed computer program and storage medium appears to consist of non-functional descriptive material; see MPEP § 2106, subsection IV.B.1(a).

***Allowable Subject Matter***

11. Claims 8 and 9 were allowed in the previous Office Action. New 35 U.S.C. § 101 rejections have been applied, therefore these claims contain allowable subject matter, but are not currently allowable.

**12. The following is a discussion of the allowable subject matter in Claims 8 and 9.**

13. The closest relevant prior art is as follows:

- Burge, P. and Shawne-Taylor, J. "Detecting Cellular Fraud Using Adaptive Prototypes". Proc. of AI Approaches to Fraud Detection and Risk Management. Pp.72-77, 1997. (Henceforth "**Burge**").
- Yamanishi, K. et al. "On-line Unsupervised Outlier Detection Using Finite Mixtures With Discounting Learning Algorithms." Proc. of the 6<sup>th</sup> ACM SIGKDD Int'l Conf. on Knowledge Discovery and Data Mining. Pp.320-324. 2000. (Henceforth "**Yamanishi**").

14. The Yamanishi reference, which post-dates the foreign priority date of the application, is relevant in regards to its discussion of the Burge reference (See MPEP §2128 and *In re Epstein*, 32 F.3d 1559, 31 USPQ2d 1817 (Fed. Cir. 1994)).

15. Examiner notes that the model in the Yamanishi reference maps to the model in the current application - for example, compare the following equations:

- (a) Equation in Specification, p.24, line 5, to Equation in Burge, p.321, col.2, "Gaussian Mixture Model", net-to-last equation.
- (b) Equation in Specification, p.24, line 8, to Equation in Burge, p.321, col.2, last equation.
- (c) Equations in Specification, p.26, to Equations in Burge, p.322, col.2, "SDEM Algorithm".
- (d) Equation in Specification, p.29, line 15 to Equation in Burge, p.322, col.2, "kernel mixture model" Eq.3.

(e) Equation In Specification, p.39, line 16, to Equation in Burge, p.323, col.1, “logarithmic loss”, last equation.

16. Examiner notes that the Applicants have admitted (Specification, p.3, paragraph 2) that the Burge reference “... relates a similar fraud detection based on unsupervised data ...”, and the Yamanishi reference teaches that the model that it discloses “ ... was inspired by the work by Burge and Shawe-Taylor.”

17. The Yamanishi reference (See p.320, col.2, para. 3) teaches the following about the Burge reference:

Note that there exists only a few works (e.g. Burge) focusing on the on-line unsupervised learning based approach [to outlier detection in data mining].

and also specifies three differences between the Burge model the Yamanishi model (See p.321, col.1, para.5) :

The design of SS [SmartSifter] was inspired by the work by Burge and Shawe-Taylor. Our work differs from [Burge] in the following regards:

1) SS [SmartSifter] treats both categorical and continuous variables, while [Burge] deals only with continuous ones.

2) While Burge uses two models in the algorithm: the long term model and the short term one, SS [SmartSifter] unifies them into one model with the aim of a clearer statistical meaning and a lower computational cost.

3) SS [SmartSifter] uses either a parametric representation for a probabilistic model or a non-parametric one, while only a non-parametric one is used in [Burge]. In Sec.3.1, we compare our parametric method with the non-parametric one to show that the former outperforms the latter both in accuracy and computation costs.

18. Moreover, Applicant's own admission (Specification, p.3, paragraphs 2-3)

regarding the Burge reference is:



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The method by P. Burge and J. Shawe-Taylor relates to a similar fraud detection based on unsupervised data. This method, however, conducts fraud detection with two non-parametric models, a short-term model and a long-term model, to make a distance between them as a criterion for an outlier. Statistical basis of the short-term model and the long-term model is insufficient to make statistical significance of a distance therebetween [sic] unclear.

In addition, preparation of two models, short-term and long-terms [sic], deteriorates calculation efficiency. Further problems are involved such as a problem that only continuous value data can be handled and not categorical data and a problem that since only non-parametric models are handled, fraud detection is unstable and inefficient.

19. Applicants persuasively argue (see amendment filed 9/16/2004, pp.22-23)

regarding claims 8 and 9 that:

- “With respect to independent claims 8 and 10, these claims require, *inter alia*, ‘data which is described both in a discrete value and a continuous value’ and ‘mean parameter’, ‘variance parameter’ and ‘weighting parameter.’ Thus, these claims require a parametric and unitary model handling both continuous variables and categorical variables. Therefore, Burge does not disclose or suggest the recitations of independent claims 8 and 10.”
- “Independent claim 9 requires, *inter alia*, ‘data which is described both in a discrete value and a continuous value’, ‘estimating a histogram with respect to said discrete value data part’ and ‘estimating a probability density with respect to a continuous value data part.’ Thus, claim 9 requires a parametric and unitary model handling both continuous variables and categorical variables. Therefore, Burge does not disclose or suggest the recitations of independent claim 9.”

20. Examiner therefore finds claims 8 and 9 contain allowable subject matter.

**21. The following is a discussion of the allowable subject matter in newly amended claims 1-3, and 10-11.**

22. The Yamanishi reference (see p.320, col.2, para. 3) teaches the following about the Burge reference:

Note that there exists only a few works (e.g. Burge) focusing on the on-line unsupervised learning based approach [to outlier detection in data mining].

and also the following (See p.321, col.1, para.5) about the Burge reference (emphasis added):

The design of SS [SmartSifter] was inspired by the work by Burge and Shawe-Taylor. Our work differs from [Burge] in the following regards:

1) SS [SmartSifter] treats both categorical and continuous variables, while [Burge] deals only with continuous ones.

2) While Burge uses two models in the algorithm: the long term model and the short term one, SS [SmartSifter] unifies them into one model with the aim of a clearer statistical meaning and a lower computational cost.

3) SS [SmartSifter] uses either **a parametric representation** for a probabilistic model or a non-parametric one, **while only a non-parametric one is used in [Burge]**. In Sec.3.1, we compare our parametric method with the non-parametric one to show that the former outperforms the latter both in accuracy and computation costs.

23. In the previous Office Actions, the Examiner indicated that these features, if amended into the claims, would differentiate the current application from the prior art. In the recent amendment (filed 8/04/2005), Applicants have expressly amended a set of parameters ("a weighting parameter, a mean parameter, and a variance parameter") into independent claims 1, 3, 10, and 11. Claim 2 depends from amended claim 1. The rejections of these claims have been withdrawn.

**24. The following paragraphs apply to claims 6-7 and 14-16.**

25. Applicants argue (see pp.13-14 of the amendment filed 8/4/2005) that claims 6-7 and 14-16 differ from Burge due to the use of distribution parameter that is based

on the data. Examiner finds that this corresponds to the teaching in Yamanishi about the Burge reference (see p.321, col.1, para.5. Emphasis added):

3) SS [SmartSifter] uses either **a parametric representation** for a probabilistic model or a non-parametric one, **while only a non-parametric one is used in [Burge]**. In Sec.3.1, we compare our parametric method with the non-parametric one to show that the former outperforms the latter both in accuracy and computation costs.

Examiner has found Applicants' arguments to be persuasive, and has withdrawn the rejections based on Burge reference.

### ***Response to Arguments***

#### **Re: 35 USC § 101**

26. Applicants have argued in the Amendment filed 8/4/2005 (see p.13) that "anomalous data detection" is a practical application, as opposed to a mathematical construct.

27. The Examiner respectfully disagrees, and directs the Applicants to MPEP § 2106 subsection (II)(A). This section of the MPEP directs the Examiner as follows (emphasis added to demonstrate that the specific practical application must be in the claim language):

Although the courts have yet to define the terms useful, concrete, and tangible in the context of the practical application requirement for purposes of these guidelines, the following examples illustrate claimed inventions that have a practical application because they produce useful, concrete, and tangible result:

- **Claims drawn to a long-distance telephone billing process** containing mathematical algorithms were held to be directed to patentable subject matter because "the claimed process applies the Boolean principle to produce a useful, concrete, tangible result without pre-empting other

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uses of the mathematical principle." *AT & T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352, 1358, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999);

- "[T]ransformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces a useful, concrete and tangible result' -- a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades." *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601; and

- Claims drawn to a rasterizer for converting discrete waveform data samples into anti- aliased pixel illumination intensity data to be displayed on a display means were held to be directed to patentable subject matter since the claims defined "a specific machine to produce a useful, concrete, and tangible result." *In re Alappat*, 33 F.3d 1526, 1544, 31 USPQ2d 1545, 1557 (Fed. Cir. 1994).

A process that consists solely of the manipulation of an abstract idea is not concrete or tangible. See *In re Warmerdam*, 33 F.3d 1354, 1360, 31 USPQ2d 1754, 1759 (Fed. Cir. 1994). See also *Schrader*, 22 F.3d at 295, 30 USPQ2d at 1459. Office personnel have the burden to establish a prima facie case that the claimed invention as a whole is directed to solely an abstract idea or to manipulation of abstract ideas or does not produce a useful result.

Only when the claim is devoid of any limitation to a practical application in the technological arts should it be rejected under 35 U.S.C. 101. Compare *Musgrave*, 431 F.2d at 893, 167 USPQ at 289; *In re Foster*, 438 F.2d 1011, 1013, 169 USPQ 99, 101 (CCPA 1971). Further, when such a rejection is made, Office personnel must expressly state how the language of the claims has been interpreted to support the rejection.

### ***Conclusion***

28. The following prior art, made of record and not relied upon, is considered pertinent to applicant's disclosure.

29. Kou, Yufeng et al. "Survey of Fraud Detection Techniques." 2004 IEEE Int'l Conf. on Networking, Sensing and Control. 2004. Vol.2, pp.749-754.

(This reference post-dates the priority filing date of the instant application, and does therefore does not qualify as prior art. It teaches in p.750, top right column, that "An advantage of unsupervised methods over supervised methods is that previously undisclosed types of fraud may be detected." Kou refers to an article by Bolton & Hand (2001) that "proposes" unsupervised credit card fraud detection. The Bolton & Hand reference postdates the instant application.

Examiner notes that Yamanishi reference teaches an unsupervised method).

30. Lu, Chang-Tien et al. "Exploiting Efficient Data Mining Techniques to Enhance Intrusion Detection Systems." 2005 IEEE Int'l Conf. on Information Reuse and Integration. Aug. 15-17, 2005. pp.512-517.

(This reference post-dates the priority filing date of the instant application, and does therefore does not qualify as prior art. It teaches different methods of outlier detection in Section 2.3 – "Outlier Detection". It also specifically teaches on p.515, top left column, that "Finite mixture and BACON are major statistical based outlier detection approaches.").

31. "Outlier Detection: nagdmc\_bacon."

(This reference describes a computer program that detects outliers according to the BACON outlier detection approach. The reference teaches on p.4 that the BACON approach was first taught in a paper by Billor et al. (2000), which post-dates the priority filing date of the instant application.)

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***Correspondence Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (571) 272-3714. The examiner can normally be reached on Monday through Thursday, and the first Friday of a bi-week, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached at (571) 272-3749.

Any response to this office action should be faxed to (571) 273- 8300, or mailed to:

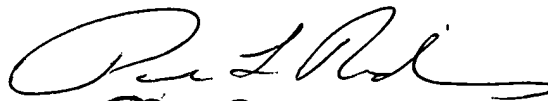
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Tech Center 2100 Receptionist, whose telephone number is (571) 272-2100.

Ayal I. Sharon  
Art Unit 2123  
October 7, 2005

  
Paul L. Rodriguez 10/12/05  
Primary Examiner  
Art Unit 2125